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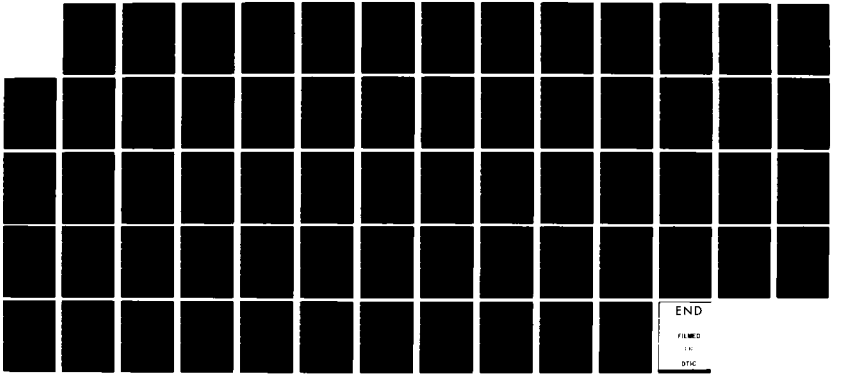

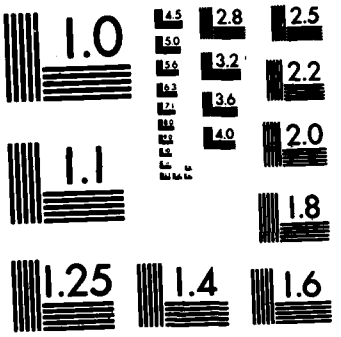

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CONTRACTING SYSTEMS DEVELOPMENT WORKLOADS

DLA SYSTEMS
AUTOMATION CENTER

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I. OVERVIEW

The Defense Logistics Agency's (DLA's) central design activity, the DLA Systems Automation Center (DSAC), is beset with large development work backlogs and extended systems development schedules. Increasing development workloads and an apparently insufficient number of personnel to handle them have precipitated the problem. One possible solution, to reduce backlogs and shorten development schedules, is to contract DSAC work to commercial systems development organizations. Another is to increase internal DSAC systems development productivity.

We conclude that both solutions should be pursued. DSAC can use contractors for some of its work, and it can increase its productivity.

Conditions which make contracting feasible can be stated as criteria. Criteria have been developed for the various types and phases of DSAC development work--for systems development projects that have not yet been implemented, for maintenance work required for systems currently in operation, and for the technical assistance functions that support both new development and maintenance work. The criteria address 1) the adequacy of systems requirements definitions and program specifications, 2) the functional knowledge required of systems analysts to effectively design new DLA systems or modify current ones, 3) the program design knowledge and programming expertise required by analysts and programmers, 4) the complexity of the new development and maintenance work, and 5) the measures required for testing new or modified systems.

Applying the criteria, we find that:

- a significant amount (approximately 40%) of planned development work can be performed by outside contractors.

- approximately 43% of DSAC's telecommunications functions and 38% of its technical support functions have contractible elements which can be performed by outside organizations.

- very little (under 10%) of DSAC's systems maintenance work can be performed by contractors.

- little (only 15%) of DSAC's current workload can be performed by contractors because most of it is for systems maintenance, but the balance is expected to shift substantially in favor of new development activity.

Computer programming appears to be the most contractible of all development activities at DSAC. DSAC should contract for outside programming assistance for all of its development sites. It should also obtain assistance from outside organizations which provide services in conceptual systems analysis and design in order for DLA to take full advantage of the most up-to-date software and computer systems technology available.

To facilitate these actions, DSAC should establish and administer a contract coordination function.

In order to increase its own internal productivity, DSAC should

- augment its computer equipment to provide adequate on-line program compiling and testing capabilities.

- identify, test, and use application generators and automated design software.

- update standards for programming languages and application software for use in the development of new systems.

II. CRITERIA FOR CONTRACTING DSAC WORKLOADS

A description of the criteria to be used by DSAC in deciding whether to place systems development work with outside organizations is presented in this section. They are more fully described and defined in terms of their application to DSAC development work in a series of step-by-step procedures in Appendix A, "Criteria for Contract Support Decisions."

For convenience in their application, the criteria are grouped into three categories of DSAC systems development activity:

- New Systems Development Work. Application systems work which has been planned and/or approved for DSAC's systems development activity. This work consists of the design of new systems and their programming and testing for DLA users.

- Systems Maintenance Work. Application systems work which is undertaken to modify/improve current systems for users. This work includes the redesign of existing applications, their reprogramming/ modification and testing.

- Technical Assistance. Development work in support of both new development and systems maintenance work, specifically the DSAC telecommunications hardware and software development activities and the activities of DSAC's Technical Support Directorate.

NEW SYSTEMS DEVELOPMENT WORK

Criteria for contracting new development work for each step in the system development process are as follows:

- Conceptual Analysis Criteria (Appendix A-1-1). This set of criteria focuses on the essential question whether the system to be developed is to utilize new hardware or software approaches and technologies, outside the current capabilities of the DSAC staff. Often, a contractor can supply a "leading edge" approach and has had experience in installing systems which have used it.

- Functional Analysis Criteria (Appendix A-1-2). Here, the key criterion is whether the inputs and outputs of the system or application to be designed are "stand alone," i.e., whether they are not dependent upon other systems to the extent that other systems must be modified to accept the features of the new system.

- Systems Analysis Criteria (Appendix A-1-3). Two major criteria are applicable in this step: (1) whether or not extensive coordination between the contractor and more than one DLA organization is required and (2) whether or not the systems interfaces described in the functional analysis criteria (above) have been identified and those interfaces are simple and few.

- Program Analysis Criteria (Appendix A-1-4). Special emphasis is placed on the functional or application knowledge of the designer during this step of development. The program analysis step is critical to the proper execution of a system, and in addition to adequate functional design documentation, programming analysts (internal to DSAC or contractor-supplied) should have solid knowledge and experience in the functional aspects of the system to be programmed.

- Programming and Program Documentation Criteria (Appendix A-1-4). Given well defined programming specifications, programming work can be performed by organizations other than DSAC without great risk. The key criterion for contracting programming work to outside contractors, therefore, is provision of adequate specifications.

Underlying the criteria described for each of the systems development steps, above, are additional criteria which address the sufficiency and expertise of DSAC/contractor staffs, the size of the effort to be contracted, and the lead-time required to accomplish the development effort (see Appendix A-1-5). Specifically considered is DSAC's staffing level to perform the development work under consideration, the special skills of contractors required to perform the work, the minimum number of workload hours which can be economically contracted to an outside organization, and the time required to contract work competitively to those organizations including elapsed time required for advertisement, RFP development, contractor response, evaluation and negotiation.

SYSTEMS MAINTENANCE WORK

Criteria for contracting systems maintenance work to outside organizations are organized according to (1) the definition of the work to be performed, (2) its complexity and its criticality to a system's ongoing operation and (3) the DSAC and contractor resources available. Appendix A-2 more fully

describes the criteria and their use. Their major elements and applications are:

- Work Definition. Development work should be screened for appropriateness for outside contracting. For example, DSAC management functions such as project supervision and coordination are not considered to be contractible despite their current inclusion in DSAC project workloads. Moreover, project task work should amount to more than 40 workload hours for economical contracting to outside organizations. Task objectives as well as outputs and inputs should also be well defined and documented.

- Work Complexity, Criticality. Systems maintenance tasks requiring extensive changes to existing master files which serve many applications, or where change logic itself is extensive and complex, are generally unsuitable to be contracted to outside organizations. In addition, tasks that interact heavily with in-process redesign work should not be assigned to outside organizations. Moreover, systems to be tested on the AUTODIN or DLA telecommunications networks should not be contracted to outside organizations until they become familiar and experienced with these networks.

- Resources. Contractors should perform systems maintenance work only when DSAC staff is not available to perform it. Contractor capability, both functional and technical, is also required for effective and efficient performance of systems maintenance work.

TECHNICAL ASSISTANCE

There are two general types of criteria for contracting DSAC telecommunications and technical support development functions. One type addresses the definition and scope of the work to be performed. The other addresses the resources and timing required to accomplish the development effort. The following are key criteria considerations for contracting out DSAC technical assistance work. Appendix A-3 provides a detailed description/procedure for applying the criteria.

- Technical Assistance Work Definition, Scope. The criteria developed address the definition of the assistance to be provided, as well as the extent and complexity of technical coordination required to develop telecommunications and technical support hardware and software concepts among DSAC users and other government agencies/organizations.

- Technical Assistance Resources, Timing. The criteria address the sufficiency of the DSAC staff, the special technical expertise required for the task under consideration, the possibility of adding the task to an existing technical assistance contract, the lead-time and

level of effort required to perform the task, and the possibility of obtaining this type of assistance through a level of effort contract arrangement with the outside firm.

III. ANALYSIS RESULTS

The contract support criteria described in the preceding section were tested on the backlog of project work at DSAC, which includes systems development project work and current planned workloads (Systems Change Requests, or SCR's). The results of those tests are presented in this report section. Also included is a review of the use of development contractors by DoD Central Design Activities (CDA's), and a review of productivity improvement techniques in use at the CDA's and DSAC.

USE OF CONTRACTORS FOR NEW SYSTEMS DEVELOPMENT PROJECTS

The criteria were tested on major systems development projects and support activities planned for future development and implementation in the DSAC Directorates of Materiel Management, Subsistence Management, Depot Management, Technical Support and Telecommunications. Those projects and activities are identified and described in the 1980 DLA Master Automatic Data Processing Plan (DMAP).

Exhibit III-1 is a summary of the results of the test. It shows that approximately 371,000 hours, or 34%, of the project workload for the Materiel Management, Subsistence Management, and Depot Management Directorates fully meet the criteria for contracting that work to outside systems development organizations. Another 58,000 hours, or 5%, are "possibly" contractible--the work does not meet all the criteria, but meets a sufficient number of them to warrant further consideration for placing it with outside organizations.

Appendix B lists all the projects to which the criteria have been applied and provides, in addition to an accounting of those hours which are estimated

EXHIBIT III-1

CONTRACTIBILITY OF NEW SYSTEMS DEVELOPMENT (DMAP) PROJECTS

DIRECTORATE	TOTAL HRS. (# PROJECTS)	HRS. CONTRACTIBLE (% TOTAL HRS.)	HRS. POSSIBLY CONTRACTIBLE (% TOTAL HRS.)	HRS. NOT CONTRACTIBLE (% TOTAL HRS.)
MATERIEL MGT.	422,800	90,000	33,450	299,350
	(8)	(21.3%)	(7.9%)	(70.8%)
SUBSISTENCE MGT.	150,300	44,040	9,360	96,900
	(7)	(29.3%)	(6.2%)	(64.5%)
DEPOT MGT.	534,000	236,900	14,900	282,200
	(2)	(44.4%)	(2.8%)	(52.8%)
TOTAL	1,107,100	370,940	57,710	678,450
	(14)	(33.5%)	(5.2%)	(61.3%)

TECH. SUPPORT - 20 of 52 (38%) DMAP (1980) functions appear, in part, contractible.

TELECOMMUNICATIONS - 9 of 21 (43%) DMAP (1980) functions appear, in part, contractible.

- 4 projects appear, in part, contractible.

to be contractible and those which are not, a description of the type of work which is contractible, and reasons, where applicable, for non-contractibility. Reasons for non-contractible work are cross-referenced to the criteria described in Appendix A.

In general, the opportunities for contracting work to outside organizations in these Directorates are as follows:

- Materiel Management, Subsistence Management--projects most contractible are those to develop subsistence applications and convert them to the Standard Automated Materiel Management Systems (SAMMS).[1]
- Depot Management--the work to develop the DoD Standard Warehousing and Shipping Automated System (DWASP) is most contractible.

In all of the Directorates, the most contractible activities are application programming, program testing and program documentation. Some smaller projects, however, such as the CONUS Transportation Bid Evaluation project, and the Master Equipment Control System (See Appendix B) are contractible in their entirety.

Exhibit III-1 also shows that 38% of the DSAC's Technical Support Directorate functions, and 43% of its Telecommunications Directorate functions meet, at least in part, the criteria for contracting their work to outside organizations. Appendix C provides a detailed listing of those functions and an analysis of the contractibility of each.

SYSTEM CHANGE REQUEST (SCR) CONTRACTIBILITY

A stratified sample of 134 SCR's (representing 10% of the total number of SCR's and 60% of the estimated hours to complete SCR project-related work) was drawn and was analyzed, after applying the criteria for contracting to outside

[1]Subsequent to the analysis phase of this study, DLA decided to develop a new subsistence system and not convert existing subsistence systems to SAMMS.

organizations to each. Each task was then reviewed with DSAC Directorate branch chiefs in order to further determine the contractibility of the tasks and to refine, thereby, the criteria themselves.

The results of this analysis and review, displayed in Exhibit III-2 are summarized as follows: (SCR analysis detail is provided in Appendix D.)

- Overall, only 14.5% or approximately 96,500 hours of SCR work qualify for contracting to outside organizations. Of this amount, 5.1% or approximately 34,000 hours qualify for contracting on a task order basis. This is because the size of the individual work packages is small (each is less than 2,000 hours). The remaining 9.4% of contractible work can be procured on a project-by-project basis.

- Approximately 53,500 hours of the Materiel Management Directorate's workload are contractible. Most of that work is for development of new programs within current systems. There is also a significant amount of the Subsistence Management Directorate's project work--approximately 28,500 hours--suitable for contracting to outsiders. Most of this work can be procured on a project-by-project basis.

- There is little (only 4.4%) contractible work in the Depot Management Directorate, because the bulk of the current effort is undefined, and because there are functional design tasks (related to DWASP) which require DSAC design staff capabilities.

- Very little SCR work in Technical Support and Telecommunications was found to be contractible because the tasks are regarded as management or administrative, which cannot be contracted to outsiders, or the tasks are not defined well enough to fully determine contractibility.

Exhibit III-3 is a tabulation of the "reasons" for non-contractibility of DSAC SCR's. This tabulation shows that two reasons account for 54% of the hours which are not contractible: the design work to be performed requires extensive internal functional systems knowledge (30%), and the task effort itself is too complex (24%) to be accomplished economically by outside companies.

CDA USE OF OUTSIDE CONTRACTORS

One aspect of our analysis of the possible use of systems development contractors to perform DSAC systems development work included a review of past work performed by contractors for other DoD central design activities (CDA's)

EXHIBIT III-2

CONTRACTIBILITY OF SYSTEM CHANGE REQUESTS*

AREA	HRS. TOTAL	HRS. CONTRACTIBLE TASK ORDERS	HRS. CONTRACTIBLE PROJECTS	HRS. NOT CONTRACTIBLE
MATERIEL MGT.	290,585	28,537	24,953	237,095
		(9.8%)	(8.6%)	(81.6%)
SUBSISTENCE MGT.	109,254	2,169	26,293	80,792
		(2.0%)	(24.1%)	(73.9%)
DEPOT MGT.	128,806	365	5,336	123,105
		(0.3%)	(4.1%)	(95.6%)
TECHNICAL SUPPORT	90,341	1,387	6,178	82,776
		(1.5%)	(6.8%)	(91.7%)
TELECOMMUNICATIONS	46,463	1,307	0	45,156
		(2.8%)	(0.0%)	(97.2%)
TOTAL	665,449	33,765	62,760	568,924
	(100.0%)	(5.1%)	(9.4%)	(85.5%)

* Excludes "A" and "N" series administrative tasks for all except the Technical Support Directorate.

EXHIBIT III-3

REASONS FOR SCR NON-CONTRACTIBILITY

	SAMPLE HOURS BY AREA						
CRITERIA CATEGORY*	MATERIEL	SUBSISTENCE	DEPOT	TECH.	TELECOM	TOTAL	
Not Eligible	6,431		7,952	28,094	4,920	47,397	14%
Not Defined	5,902		15,285	29,054	2,656	52,897	16%
DSAC Functional Knowledge Required	24,046	20,398	55,137		370	99,951	30%
DSAC System Design Knowledge Reqd.	9,864	13,597	102			23,563	7%
DSAC Program Design Knowledge Reqd.	8,248	7,395		6,197		21,840	7%
Programs Too Critical	4,509		300			4,809	1%
Effort Too Complex	46,293	14,044	20,752			81,089	24%
Operational Test Environment Reqd.				2,041		2,041	1%
TOTAL	105,293	55,434	99,528	65,386	7,946	333,587	100%

*See Exhibit III-3A definitions of criteria categories.

EXHIBIT III-3A

DESCRIPTION OF CRITERIA CATEGORIES

Category	Description
Not eligible	Management or administrative functions, suspended or cancelled tasks, lead time not sufficient to contract.
Not defined	Blanket order; incomplete definition of work to be performed.
DSAC functional knowledge required	Requirement to modify/redesign existing application; not a "stand-alone" new system.
DSAC system design knowledge required	Requirement to modify/redesign existing system--interfaces in new system not well identified.
DSAC program design knowledge required	Requirement for substantial application systems design knowledge by ADP analysts.
Programs too critical	Large, critical programs in major operational system; custom DSAC systems software used in fielded systems.
Effort too complex	Master file changes, multiple subsystems, functionally complex, ten or more programs involved, simultaneous DSAC changes to many systems required.
Operational test environment required	AUTODIN, DLA telecommunications network, or operational system access required.

and other federal government agencies. The objectives of the review were to compare the extent and kind of DSAC's use of outside contractors to that of the other CDA's, and as a result of the comparison, identify possible new opportunities for DSAC to contract its development work.

Exhibit III-4 provides a comparison of the use of contractors by DoD for application systems and for other uses such as computer configuration analysis, training, and software development. From this comparison, it can be seen that contractors have been used by the CDA's, including DSAC, in a wide range of application development activities including turnkey systems development and maintenance, software conversion activities, programming and programming documentation, programming specifications, data base design, and prototype applications development and testing.

While DSAC appears to compare favorably with other CDA's in contracting documentation activities, application analysis activities, franchised system development and maintenance, configuration analysis and training to systems developers and vendors, other CDA's have made more extensive use of systems software development than has DSAC. They are also using contractors for the development of minor, stand-alone application systems.

Neither the CDA's reviewed nor DSAC, however, have contracted out the development and/or maintenance of their major systems efforts. On the other hand, of DLA headquarters and the "civilian" agencies reviewed, all had contracted major systems development efforts. One agency now contracts its entire central design activity to two commercial systems development companies--one company is assigned exclusive responsibility for systems development, the other for maintenance. Our review and discussions with people in these organizations with regard to the feasibility and appropriateness of contracting out major system work to outside organizations led us to conclude

EXHIBIT III-4

USE OF CONTRACTORS BY DoD CENTRAL DESIGN ACTIVITIES

CONTRACTOR-Use \ CDA	A	B	C	D	DSAC
FOR APPLICATION SYSTEMS	HARDWARE VENDORS- 1) Software conversion (large contract) 2) Turnkey system acquisition (large contract) RELATED ADP ACTIVITIES- Franchised system development and maintenance	UNIVERSITY- Considering small contract to assist with conversions to new equipment	GSA CONTRACTOR- Programming, documentation in new system development (multiple, small tasks) SOFTWARE VENDOR- DBMS and applications protyping RELATED ADP ACTIVITIES- Franchised system development and maintenance	SYSTEMS COMPANIES- 1) Programming, documentation in new system development (multiple, large contract). Some program specifications also contracted 2) Turnkey software design and development, enhancement and maintenance GSA CONTRACTOR- Feasibility study for systems software	GSA CONTRACTOR- Documentation SYSTEMS COMPANIES- 1) System architecture 2) Transition analysis 3) Feasibility study 4) Program conversion RELATED ADP ACTIVITIES- Franchised system development and maintenance
FOR OTHER USES	FEDSIM- Computer configuration analysis OTHER VENDORS- 1) Training 2) Word/text processing system development 3) Text data center operation (planned--during conversion)	FEDSIM- Computer configuration analysis OTHER VENDORS- 1) Systems software development 2) Training	HARDWARE VENDOR- Turnkey system acquisition for communications SOFTWARE VENDORS- 1) Installation 2) Training 3) Custom tailoring UNIVERSITY- 1) Systems software development 2) Analysis 3) Training	SOFTWARE VENDOR- 1) Training 2) Consulting 3) Custom development/maintenance	HARDWARE VENDOR- 1) System generation 2) Training FEDSIM- Computer configuration analysis RESEARCH ORG.- 1) Computer sizing 2) Management studies

that there are many opportunities for DSAC to do the same. This conclusion is supported by the results of our analysis of DSAC projects applying the criteria developed for necessary contracting-out decisions.

DSAC PRODUCTIVITY IMPROVEMENT

Concurrent with the review of the use of development contractors by CDA's and other agencies, a review of the use of systems development "productivity tools" was undertaken. Exhibit III-5 displays and describes the status of the data base management system (DBMS), programmer dictionaries, COBOL translators, structured design, etc., in use at DSAC and the other CDA's. From this analysis, together with a review of the use made of these tools in other government agencies and commercial systems development organizations, we conclude that:

- One of the most effective productivity steps to be taken by DSAC is that of upgrading the capacity and throughput of its test facility computers for on-line programming; program compiling.

- While DSAC has used its internally-developed SAMTAM and MOTAM data base management systems, and is implementing a commercial DBMS (TOTAL) for existing and planned applications, further use of DBMS's is indicated to avoid the development expense involved in enhancing "home grown" systems and to take full advantage of the features of more recently developed systems. Moreover, we believe these DBMS's should be implemented in new, on-line systems, rather than fitted into existing, batch-oriented system environment.

- While DSAC has used a significant number of systems management, design and testing tools, more advanced tools could be used. We believe DSAC should investigate further the use of application generators, applications prototyping, data base design packages (described above), and, in particular, the use of the Problem Statement Language/Problem Statement Analyzer (PSL/PSA) package.

EXHIBIT III-5

USE OF PRODUCTIVITY TOOLS BY DoD CENTRAL DESIGN ACTIVITIES

Development Productivity Tools \ CDA	A	B	C	D	DSAC
DBMS	Homegrown with query language moving to hardware vendor's DBMS with new equipment	None currently. Expect one to be adopted soon. Encourage query language use to minimize report requirements.	Limited use for applications. New homegrown DBMS to be implemented soon.	Some DBMS use in new systems. Major systems to be moved to new equipment and use DBMS.	Limited homegrown packages. Commercial DBMS being introduced in one major system, others planned.
PROGRAMMER FACILITIES	Currently limited by old equipment. Cards, some RJE, some on-line entry. New work stations in development stage.	Mostly cards. Some on-line terminals. With new equipment planned, will go to on-line entry	Mixture of cards, programmer terminals. Will install work stations later. Also remote laser printers.	Currently limited by old equipment. Use cards, some RJE, some on-line job management. Minicomputers use on-line development.	Currently limited by old equipment. Substantial use of terminals (1:3 ratio). Many programmer utilities. Limited on-line program development.
OTHER TOOLS REPORTED BY CDA	Expert Review Committees.	Plan to utilize applications generator in future.	Data dictionary Data base designer (integrated with dictionary) PSL/PSA Applications generator Prototyping applications with DBMS COBOL translators Code structuring software	Structured methods Testing PSL/PSA Machine-independent code Standard record descriptions Studying data dictionaries	Data dictionary Structured methods Shorthand COBOL Standards validator Standard record descriptions COBOL translator Cross referencer Hierarchy analyzer Testing utilities Productivity committees

IV. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations for contracting DSAC development work result from our developing, reviewing, and testing the criteria for contracting DSAC systems development workloads, and reviewing other organizations' contracting practices and productivity improvement measures.

Overall, we believe the criteria developed, reviewed, and refined with DSAC, DLA, and CDA personnel and other government and commercial organization personnel will effectively identify DSAC systems development work that can be successfully accomplished by outside contractors. We further believe that the criteria developed meet the requirement of "minimal risk", i.e., they minimize the risk of problems which can occur with contractor-developed systems, particularly those related to the potential lack of contractor functional design expertise and to the appropriateness of the work itself for contracting, including its definitiveness, complexity, and criticality to other DLA systems and processes.

Other conclusions and recommendations follow.

CONCLUSIONS

1. Of all DSAC development activities reviewed, the programming activity is the one most contractible to outside development organizations.
2. Because the conceptual design activity is the most critical to the life of the system to be developed, and because systems development (hardware and software) technology continues to develop and advance at an extremely accelerated rate, it is important for DSAC to take advantage of "leading-edge" concepts

in systems development. These concepts are most readily provided by development organizations with expertise and experience in conceptual systems design.

3. Because of the relative high complexity of DLA's logistics information systems, particularly subsistence, materiel management and distribution systems, the contracting of the functional analysis and specification activities for these systems to outside organizations is not indicated. DSAC personnel, who are well qualified and experienced in the development of these systems, are needed to guide their design in response to DLA user requirements.

4. There appears to be little opportunity, in the short run, for contracting systems maintenance work to outside organizations.

5. From the analysis and review undertaken in the technical assistance directorates of Telecommunications and Technical Support, it is concluded that there are a significant number of functions in these directorates with potential for contractor assistance.

6. Because of the substantial amount of work determined to be eligible for contracting to commercial systems development organizations (more than 525,000 hours of DMAP and SCR workload), there is a need for DSAC to establish a contract coordinating office to assist systems and technical staffs in contracting work to those organizations.

7. DSAC's internal systems development productivity can be significantly increased by the addition of adequate computing equipment (additional capacity and throughput capability) for

programming and testing computer applications. In addition to utilizing advanced DBMS's, application generators, applications prototyping, and the PSL/PSA software package, DSAC needs to upgrade its development, design, and documentation standards in order to take advantage of these and other new design concepts and technologies.

RECOMMENDATIONS

In line with the foregoing conclusions, the following steps for contracting workloads and improving productivity are recommended.

1. It is recommended that DSAC and DLA Headquarters staff proceed to a) identify the specific programming workload they desire to be assigned to contract programming organizations (from the recommended project workload lists in Appendices B, C, and D), b) identify qualified contractors, and c) prepare work statements for inclusion in requests for proposals to be issued for competitive bidding.
2. It is recommended that DSAC and DLA identify (from the list in Appendix B) conceptual design work in major system and subsystem development projects where current DSAC systems technology is viewed as less than up-to-date. Specifically, the conceptual analysis for the new subsistence system should be considered, as well as the effort to develop a new, on-line SAMMS.
3. In order to assure conformity in systems design to user requirements, DSAC functional analysis groups should continue to develop and produce functional design specifications and act as contract officer's technical representatives (COTR's) for

conceptual design of entire new systems by outside development organizations.

4. It is recommended that DSAC systems design and programming staff continue to modify, effectively and economically, the systems currently in place with DLA users. We also recommend the use of that staff to maintain the new systems developed by contractors, in order to assure that systems development and maintenance do not become "locked in" to an outside contractor's organization.

5. In order to take full advantage of contractor assistance in the telecommunication and technical support functions, we recommend that DSAC review current project plans and the recommendations for contracting to outside organizations in Appendix C to identify specific workloads/projects to be contracted.

6. With the assistance of DLA headquarters, DSAC should establish a contract coordinating office under a DSAC administrative organization, such as DSAC's Office of Planning and Management.

7. We recommend that DSAC undertake a feasibility study to determine the best strategy for upgrading computer capacity and throughput (for the computer maintenance and peripheral equipment) in order to increase productivity in DSAC's programming design and test activities. We also recommend that DSAC initiate a research program to identify and test, on a continuing basis, new development methodologies. Application generators and automated design tools should be investigated immediately, in addition to identifying and testing new DBMS's. It is also recommended that the Center update its standards for the use of new programming languages and applications systems.

APPENDIX A

CRITERIA FOR CONTRACT SUPPORT DECISIONS

A-1. New Systems Development

A-2. Systems Maintenance

A-3. Technical Assistance

APPENDIX A-1

NEW SYSTEMS DEVELOPMENT

The following are the criteria, in flow diagram form, for making contract support decisions for new systems development work. These criteria are used for entirely new systems development work or the rework of current DSAC systems, subsystems, or applications. Criteria for the systems implementation phase, e.g., file, data, conversion activities of a development project, were not developed based on the assumption that DSAC would assume complete responsibility for this project phase.

Explanatory notes accompany the diagrams (pages A-1-6, A-1-7).

1. CONCEPTUAL ANALYSIS

1.1 Define Objectives

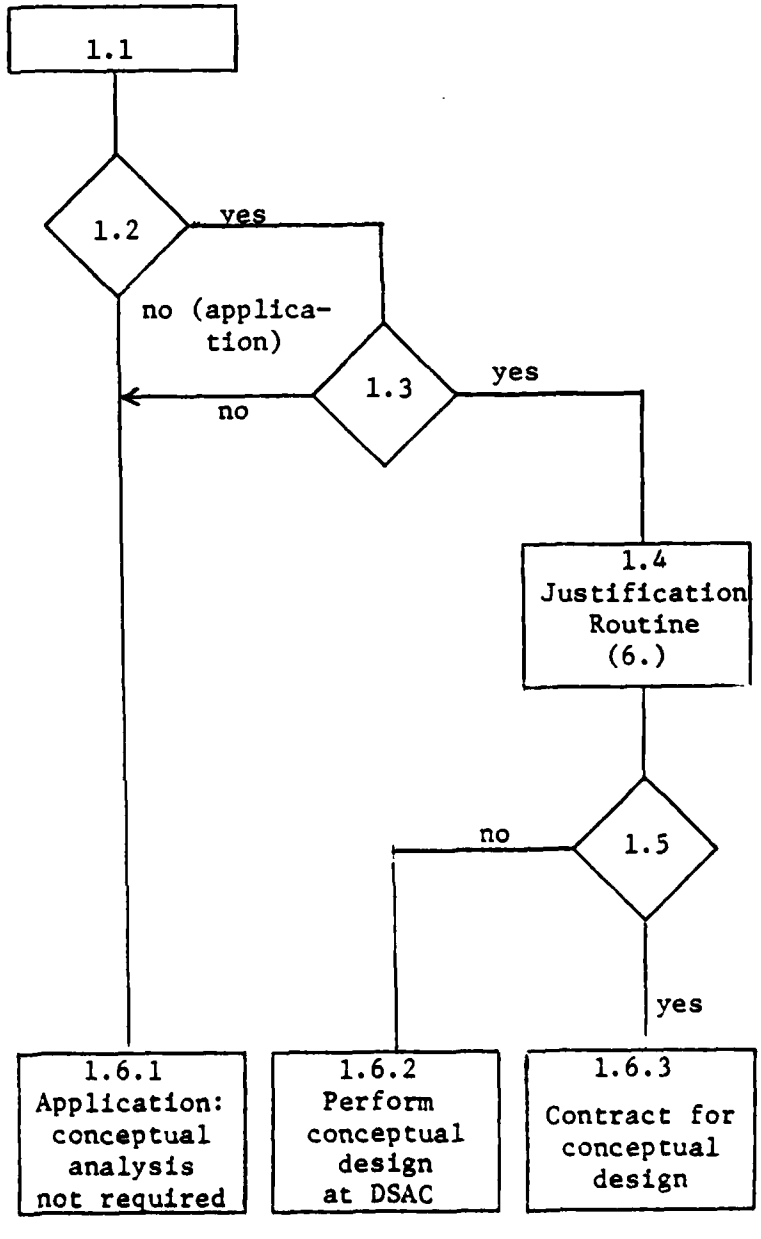
1.2 Is the effort to develop or redevelop a system or subsystem?

1.3 Does the effort involve new technology or a new application area?

1.4 Justify contracting.

1.5 Is contracting indicated?

1.6 Action



2. FUNCTIONAL ANALYSIS

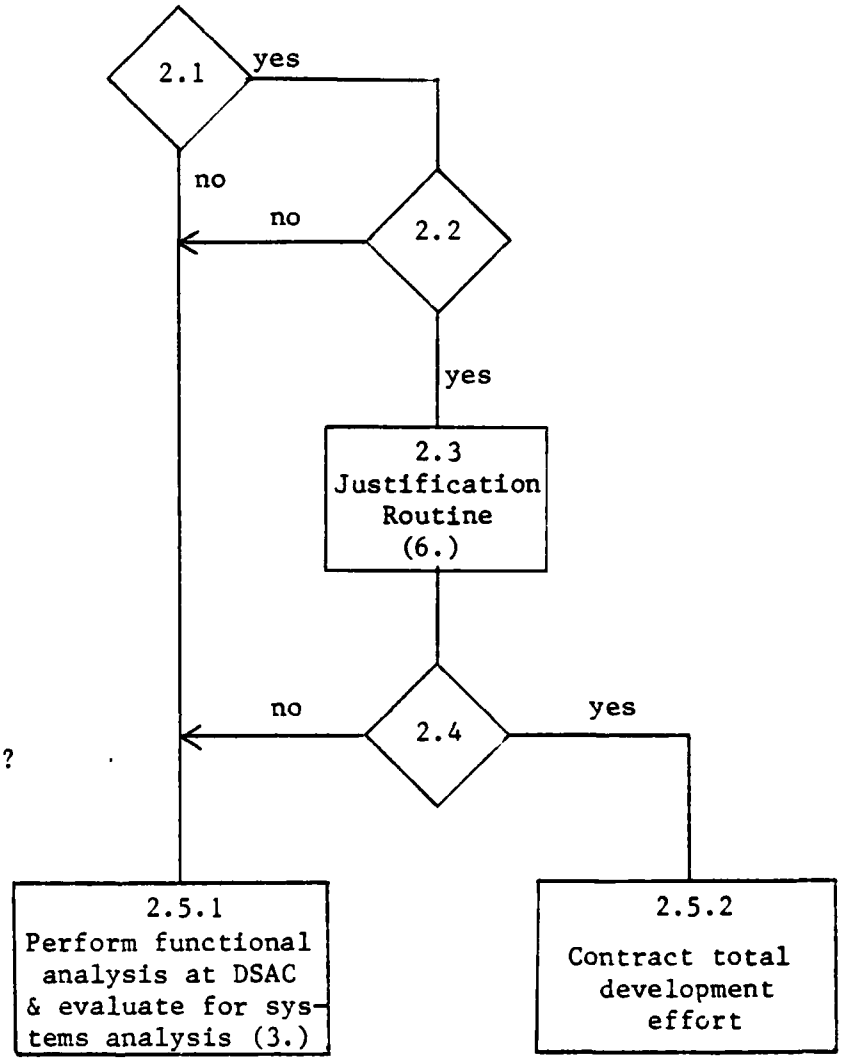
2.1 Are functional management requirements clearly stated?

2.2 Does the system stand alone?

2.3 Justify contracting.

2.4 Is contracting indicated?

2.5 Action



3. SYSTEMS ANALYSIS

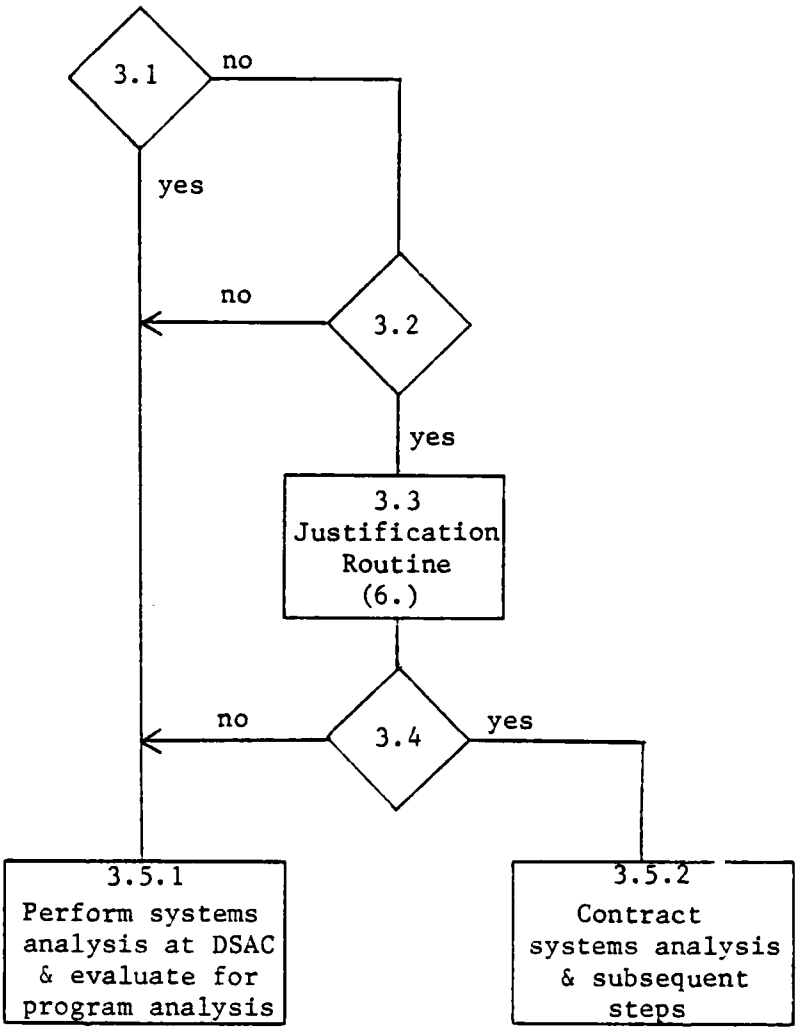
3.1 Do related efforts/co-ordination problems exist?

3.2 Are the interfaces to be specified few and identified?

3.3 Justify contracting.

3.4 Is contracting indicated?

3.5 Action

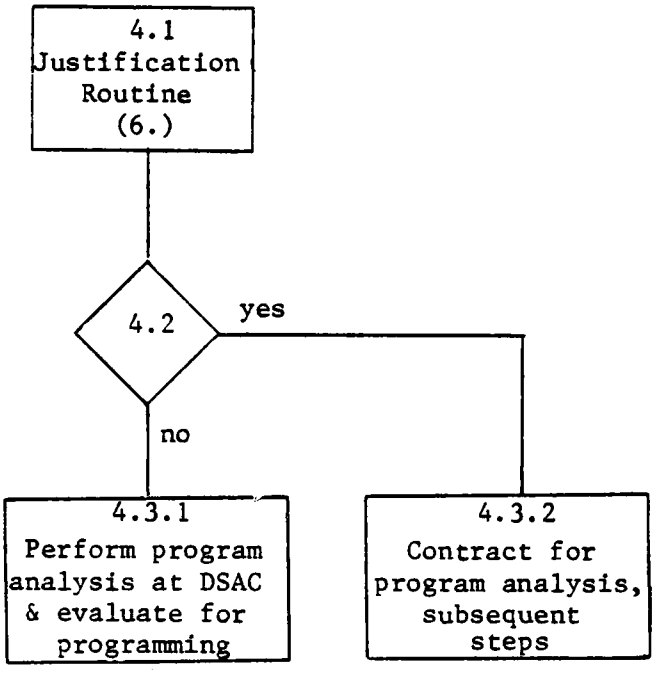


4. PROGRAM ANALYSIS

4.1 Justify contracting.

4.2 Is contracting indicated?

4.3 Action

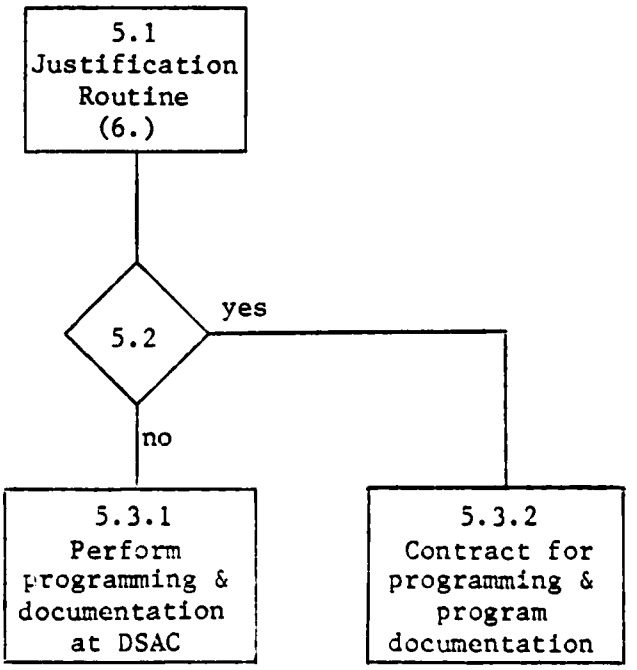


5. PROGRAMMING AND PROGRAM DOCUMENTATION

5.1 Justify contracting.

5.2 Is contracting indicated?

5.3 Action



6. JUSTIFICATION ROUTINE

6.1 Is DSAC staff sufficient?

6.2 Is special technical expertise needed, cost justified?

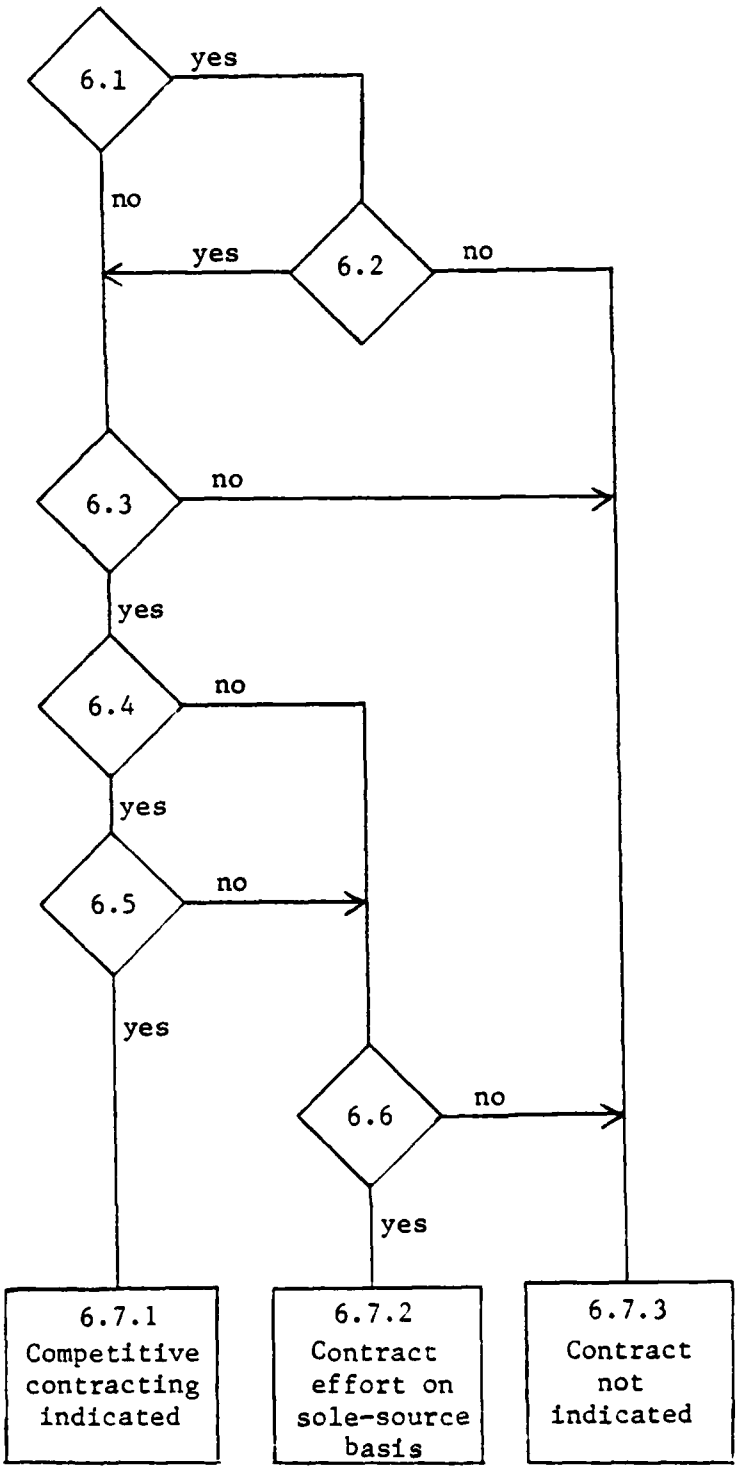
6.3 Do potential contractors have expertise required?

6.4 Is the level of effort at east 2000 hours?

6.5 Is there sufficient time to contract competitively?

6.6 Can the effort be "sole-sourced" on existing or new contract?

6.7 Action



FLOW DIAGRAM NOTES, NEW SYSTEMS DEVELOPMENT CRITERIA

Criteria Procedure Step	Notes/Remarks
1.1	System requirements, objectives should be defined (including automation requirements). Development project completion time is a must. See Section 4.1, FIPS PUB 64 for guidance in defining objectives, requirements.
1.2	Conceptual analysis should be undertaken when a major system or subsystem is to be developed. Applications may not require a "full-blown" conceptual design analysis effort.
1.3	Any "new" development activity to DSAC (application design, hardware configuration, communication network, etc.). Only contractors with an implementation "track record" should be used.
1.4	The "justification routine," common to all new development criteria. Addresses contractibility from a staffing, technical expertise, economic and project leadtime requirement view.
1.5	Decision dependent on results of the "justification routine."
1.6	If work to be performed does not involve a major redesign effort (small, application level work) or does not involve major advance in software or computer hardware technology, conceptual design work is probably not indicated, or could be included as part of the functional design effort for the entire system to be developed.
2.1	Includes user objectives, requirements and major processes including data flows, input and output specification.
2.2	Our discussions with DSAC staff have produced the following definition of a "stand-alone" system: a system "stands alone" and hence, is contractible to outside organizations when its inputs and outputs can be and are specified during the functional analysis phase of a development project. If their definition must be deferred until the systems design phase of the project, because of parallel design efforts which will affect the system, a stand-alone situation does not exist, and hence, contracting the effort should not be undertaken.

FLOW DIAGRAM NOTES, NEW SYSTEMS DEVELOPMENT CRITERIA

Criteria Procedure Step	Notes/Remarks
2.4	Decision dependent on results of the "justification routine."
3.1	Parallel development efforts, such as the effort to select a DBMS in support of the system or application under review, would mitigate against contracting the applications development work to outsiders.
3.2	All inputs and outputs not fully defined in the functional specification should be few (less than 10% of all inputs/outputs). As a minimum, they should be identified and briefly described in the functional specification.
6.1	Adequate numbers of DSAC staff should be available to complete the work within the time required by the user.
6.2	Pertains to all kinds of expertise: functional, design, systems design, programming design, programming, hardware, telecommunications, etc.
6.3	Contractors should have a "hierarchy of skills" capability: in order to perform program or systems analysis activities well, functional knowledge of the systems to be developed is required, in addition to programming and hardware knowledge.
6.4	Less than 2000 hours of effort for any single development contract would prove uneconomical to both DSAC and the contractor.
6.5	Contracting competitively involves time to be provided RFP development, bidder response, DSAC evaluation and contract negotiation. Programming contracts could probably be obtained in six months. Major systems procurements could take as long as nine months.
6.6	If sole-source contracting can be justified and DSAC has an existing vendor contract (level of effort) to which the work under consideration could be added, then a contract effort on a sole-source basis is indicated.

APPENDIX A-2

SYSTEMS MAINTENANCE

The following are the criteria for contract support for system maintenance tasks. It is assumed that a level-of-effort contract/basic ordering agreement can be obtained for on-site contractor support for systems maintenance work.

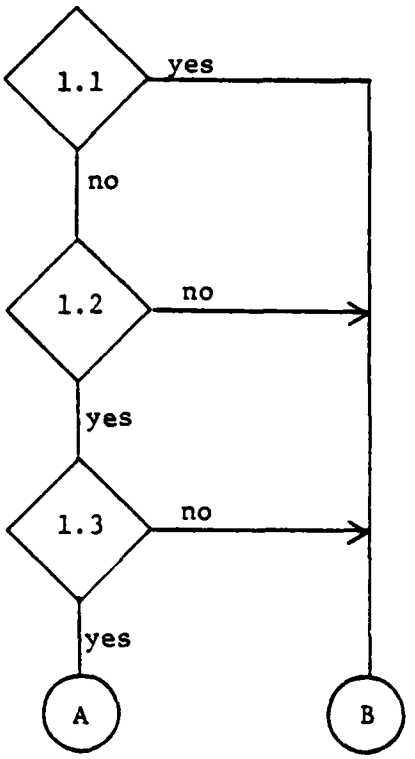
Criteria are more fully described in the accompanying notes (page A-2-4).

1. WORK ELIGIBILITY

1.1 Does the work involve management functions?

1.2 Is the task active, and more than 40 hours?

1.3 Is the work well defined?



2. WORK COMPLEXITY, CRITICALITY

2.1 Are master file changes required?

2.2 Is more than one sub-system involved?

2.3 Are complex logic changes involved?

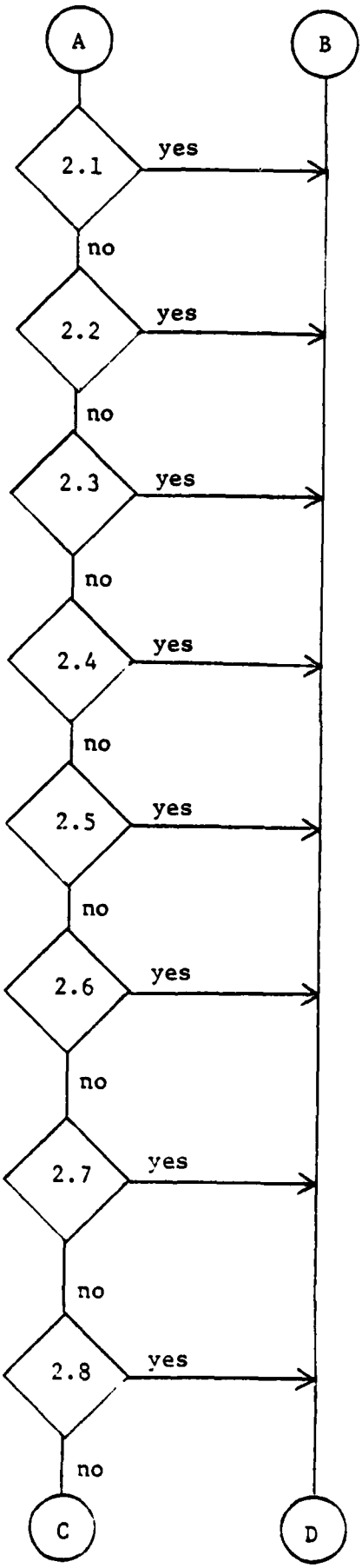
2.4 Are changes to large or critical programs required?

2.5 Are ten or more programs involved?

2.6 Are programs currently being changed by DSAC involved?

2.7 Are changes to DSAC developed system software required?

2.8 Is access to AUTODIN, DLA network, operational system required to test?



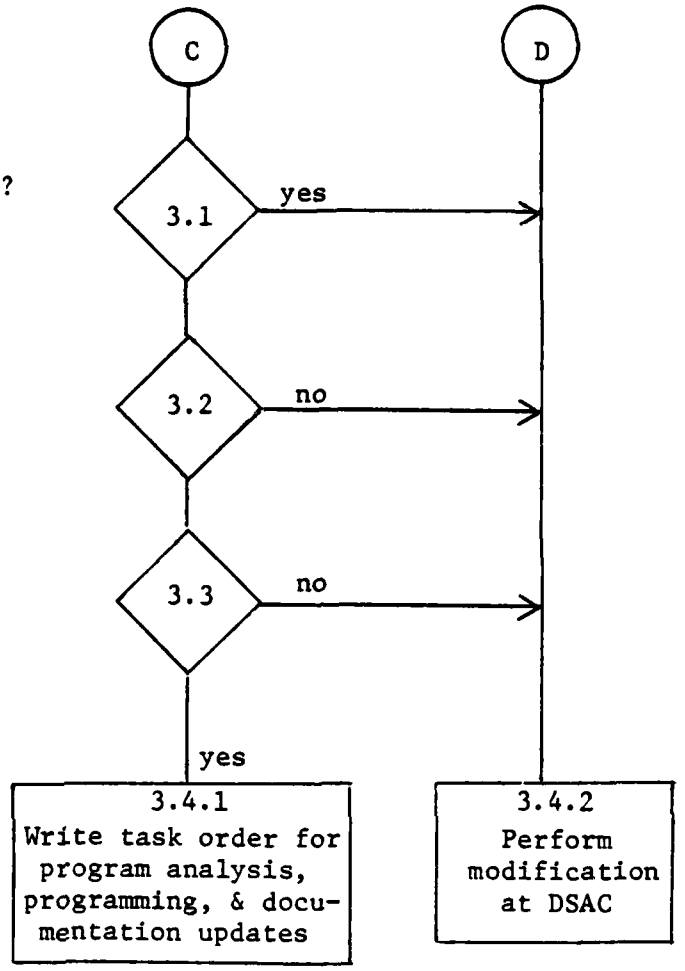
3. JUSTIFICATION

3.1 Is DSAC staff sufficient?

3.2 Does the contractor have staff and expertise required?

3.3 Can the effort be added to existing contract?

3.4 Action



FLOW DIAGRAM NOTES, SYSTEMS MAINTENANCE CRITERIA

Criteria Procedure Step	Notes/Remarks
1.1	Includes the management activities of project coordination, supervision and DSAC representation which would not normally be contracted to a commercial organization.
1.2	Tasks expected to be on "hold" status (PMS) for more than 30 days should not be considered. For maintenance work, less than one person-weeks is not economical to assign to an outside organization, even on a level-of-effort contract basis.
2.1	Files common to many applications should be maintained by DSAC staff.
2.2	When changes affect more than one subsystem, it is difficult to manage the change process.
2.3	Certain changes involve highly complex functional logic which should not be changed by contractor personnel.
2.4	Critical programs are those which involve mainstream processing, i.e., many or all transactions are processed even through a jobstream.
2.5	When large numbers of programs are changed simultaneously, management of the change process is unwieldy.
2.6	Contracting to outsiders would cause coordination problems, under these circumstances.
2.7	Special experience or learning required to modify these systems: DSAC staff only.
2.8	Security considerations.
3.3	Task must match existing scope of work.

APPENDIX A-3

TECHNICAL ASSISTANCE

The following are the criteria for evaluating technical assistance contractibility.

Criteria are further described in the accompanying notes (page A-3-3).

1. TYPE OF WORK LIMITATIONS

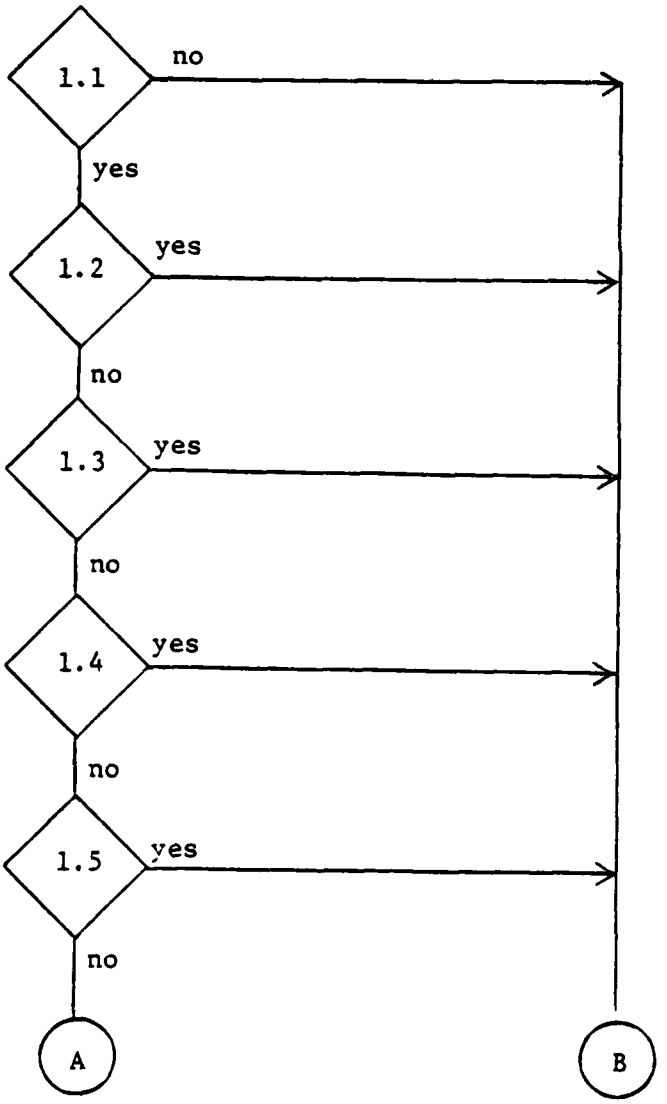
1.1 Is work/deliverable well defined?

1.2 Does the work relate only to DSAC management tasks?

1.3 Does the work require management coordination with other DSAC Directorates?

1.4 Does the work require direction of government personnel?

1.5 Does the work require representing DSAC in interagency activities?



2. JUSTIFICATION

2.1 Is DSAC staff sufficient?

2.2 Is special technical expertise needed or cost-justified?

2.3 Do potential contractors have expertise required?

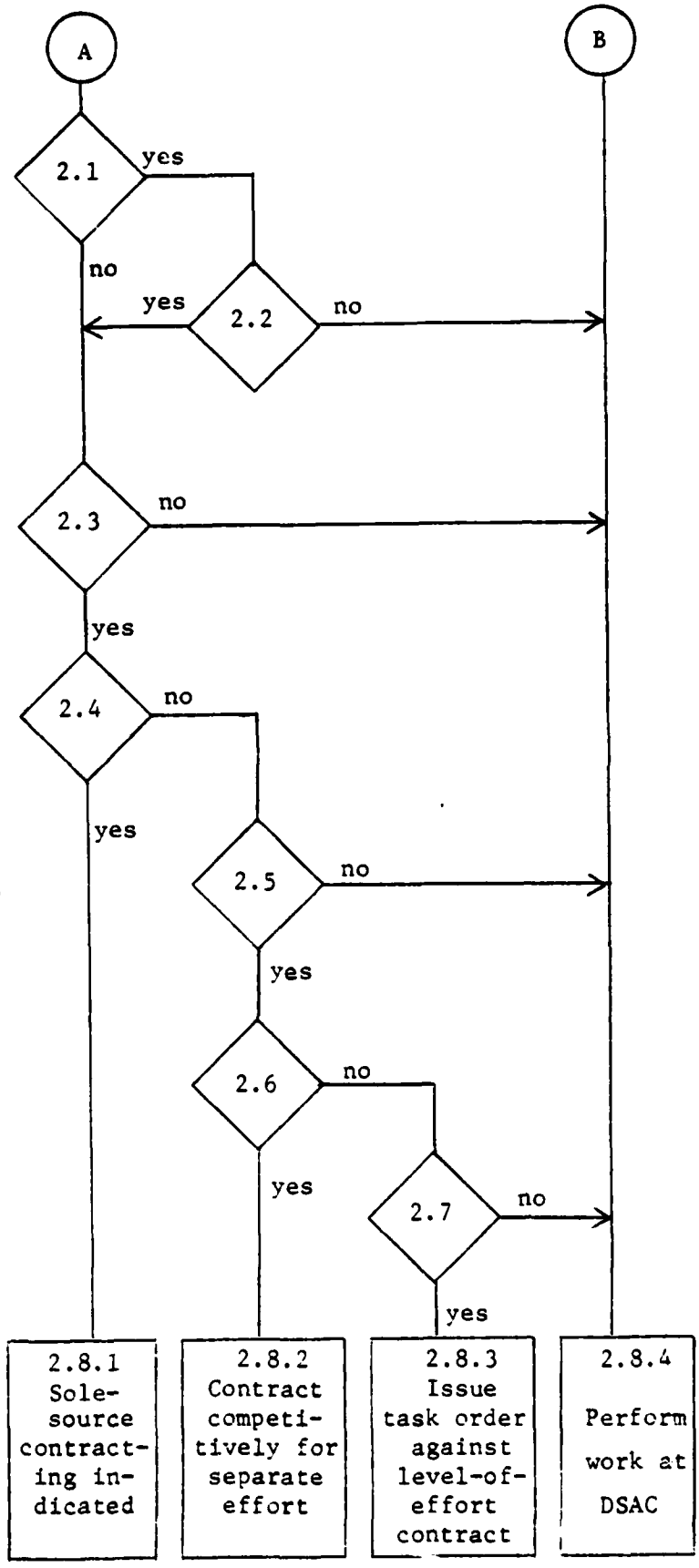
2.4 Can the effort be "sole sourced" on existing or new contract?

2.5 Is there sufficient time to contract competitively?

2.6 Is the level of effort at least 2000 hours?

2.7 Will similar tasks occur within a year?

2.8 Action



FLOW DIAGRAM NOTES, TECHNICAL ASSISTANCE CRITERIA

Criteria Procedure Step	Notes/Remarks
1.2, 1.3	See step 1.1, Appendix A-2.
1.4	A pitfall for technical assistance work: contractors not to direct DSAC personnel in project work.
1.5	Contractor responsibility for interagency AUTODIN, ADPER projects should be discouraged.
2.7	Forecast of similar work needed to determine.

APPENDIX B

CRITERIA APPLIED TO DMAP PROJECTS

APPENDIX B

CRITERIA APPLIED TO DMAP PROJECTS

DSAC's 1980 DMAP[1] plan was reviewed to identify projects within the DSAC Materiel Management, Subsistence Management, and Depot Management Directorates. More recent major systems development projects were also included via information provided by DSAC and DLA Headquarters management personnel.

Estimates of the amount of development effort required by project stage were assigned to each project as follows:

Project Stage		Est. Amount (%) of Effort Required
Functional Analysis	-	30%
Systems Analysis	-	20%
Program Analysis	-	20%
Programming	-	30%
		100%

These percentages are based on the proportion of DSAC staff assigned to project functions. They were reviewed and validated with DSAC management personnel.

[1]DLA Master Automatic Data Processing Plan, Section IV, Central Design Activity-DSAC, June 1980.

EXHIBIT B-1

DSAC FUTURE PROJECT CONTRACTING
MATERIEL MANAGEMENT SYSTEMS•

DMAP Project No.	Project Name	Total Hours	Hrs.Contractible	Hrs.Possibly Contractible	Hrs.Not Contractible	Contractible Work	Reasons for Non-contractibility (Appendix A Criteria Reference)
M030	ADPER	180,000	90,000		90,000	Data conversion programs, conversion of standard COBOL programs	Conversion of complex, critical programs (A-2:2.4), effort management 9A-2:1.7), implementation (A-1:Introduction)
M100	Subsistence[1]	110,000		13,750	96,250	Program analysis of new programs (est. 25%)	Needs DSAC functional analysis, systems analysis due to interfaces (A-1:2.2,3.2); DSAC to modify existing programs (no maintenance contract assumed)
M202	School Supplies	2,800		700	2,100	Program analysis of new programs (est. 50%)	Needs DSAC functional analysis, systems analysis due to interfaces (A-1:2.2,3.2); DSAC to modify existing programs (no maintenance contract assumed)
M208	Interchangeability and Substitutibility	100,000			100,000		Needs definition of work (A-1:2.1), May be contractible in part later
M209	Conversion to SAMTAM (may be part of DBMS)	10,000		5,000	5,000	Programming, or development of conversion routine and actual program conversion	Actual work needs definition, planning, implementation (A-3:1.1)
DSAC[2]	On-line Technical Information Storage and Retrieval	20,000		14,000	6,000	Systems analysis	Needs definition, DSAC functional analysis (A-1:2.1)

Exhibit B-1 (cont.)

DMAP Project No.	Project Name	Total Hours	Hrs. Contractible	Hrs. Possibly Contractible	Hrs. Not Contractible	Contractible Work	Reasons for Non-contractibility
DSAC	Critical Program Redevelopment[3]					Program analysis, redesign, coding, test, documentation (No change in system or program function)	
DSAC	SAMMS Modernization[3]					Conceptual redesign new program analysis. System design possibly contractible.	Needs DSAC functional analysis due to mixture of functional requirements (A-1:6.3). DSAC to rework some salvageable existing programs (no maintenance contract assumed)
		422,800	90,000 (21.3%)	33,450 (7.9%)	299,350 (70.8%)		

[1]Project cancelled (11/81) with decision to build the new FDS-DISMS at DSAC-W.

[2]Identified by DSAC staff.

[3]Estimate of hours not available.

EXHIBIT B-2

DSAC FUTURE PROJECT CONTRACTING
SUBSISTENCE MANAGEMENT SYSTEMS

Source	Project Name	Total Hours	Hrs. Contractible	Hrs. Possibly Contractible	Hrs. Not Contractible	Contractible Work	Reasons for Non-contractibility
DSAC	Real Time Access and Updating--Contract and Funds Control Files	4,500		2,250	2,250	Program analysis for new programs	Needs DSAC functional analysis, systems analysis due to interfaces (A-1:2.2,3.2). Maintenance of existing programs (no maintenance contract assumed)
DSAC	Automate Brand Name Supply Bulletin	3,700	2,590	1,110		Systems analysis, possibly functional analysis	
DSAC	Automate Evaluation of Bids for CONUS Transportation	2,600	2,600			Total contract	
DSAC	Financial System Replacement[1]	11,500	3,450		8,050	Programming	Needs DSAC functional analysis, systems analysis due to interfaces (A-1:2.2,3.2); DSAC program analysis due to functional knowledge (A-1:6.3)
DSAC	Food Distribution MIS	8,000	2,400		5,600	Programming	Needs DSAC functional analysis, system analysis due to interfaces (A-1:2.2,3.2); DSAC program analysis due to functional knowledge (A-1:6.3)

Exhibit B-2 (cont.)

Source	Project Name	Total Hours	Hrs.Contractible	Hrs.Possibly Contractible	Hrs.Not Contractible	Contractible Work	Reasons for Non-contractibility
DSAC	SAMMS Conversion[1]	60,000	9,000		51,000	New programming (50%)	Needs DSAC functional analysis, system analysis due to interfaces (A-1:2.2,3.2). DSAC modifications to existing programs (no maintenance contract assumed)
DSAC	Implement FDS with DBMS[2]	60,000	24,000	6,000	30,000	DB design (6,000); programming, (18,000; also conceptual analysis possible for design using on-line techniques (6,000), depending on time availability	Needs DSAC functional analysis, system analysis due to interfaces (A-1:2.2,3.2), DSAC program analysis due to functional requirements (A-1:6.3)
		150,300	44,040	99,360	96,900		
		(7)	(29.3%)	(6.2%)	(64.5%)		

[1] Deleted; to be replaced by an integrated FDS-DISMS at DSAC-W.

[2] DISMS project merged into this project; total hours reflect the entire total effort.

EXHIBIT B-3

DSAC FUTURE PROJECT CONTRACTING
DEPOT MANAGEMENT SYSTEMS

DMAP Project No.	Project Name	Total Hours	Hrs.Contractible	Hrs.Possibly Contractible	Hrs.Not Contractible	Contractible Work	Reasons for Non-contractibility
D201-D205	DWASP	520,000	222,900	14,900	282,200	Programming, etc. Possible to contract assistance in data base design (2%)	Time to contract is not sufficient for functional analysis (nearly complete) or systems analysis (just starting) (A-1:6.5,6.6). Analysis for subsystems not possible due to interfaces (A-1:3.2). DSAC staff sufficient for program analysis (A-1:6.1,6.2)
D206	Master Equipment Control System	14,000	14,000	-	-	Total project	
		534,000	236,900	14,900	282,200		
			(44.4%)	(2.8%)	(52.8%)		

APPENDIX C

CRITERIA APPLIED TO TECHNICAL ASSISTANCE FUNCTIONS

APPENDIX C

CRITERIA APPLIED TO TECHNICAL ASSISTANCE FUNCTIONS

The 1980 DMAP plan of DSAC does not list projects for the Telecommunications and Technical Support Directorates. Instead, it lists "objectives," or the activities which support other development functions. The following chart lists those functions and displays our analysis of their contractibility.

EXHIBIT C-1

CONTRACTING DSAC TECHNICAL SUPPORT OBJECTIVES

DMAP No.	Objective	Contracti-bility	Contractible Portion	Reasons for Non-Contractibility (Appendix A Criteria Reference)
T010	Management and Supervision	No		Management function (A-3:1.4)
T020	Administrative Support	No		Must be directly supervised (A-3:1.4)
T030	ADPER	No		Technical assistance to DLA Hdq. (A-3:1.5)
T040	DWASP	No		Only coordination at Columbus (A-3:1.5)
T110	Data Element Standardization System	No		Coordination (A-3:1.3)
T201	Configuration Control, Planning and Management	No		Undefined deliverables (A-3:1.1), management functions (A-3:1.2)
T202	Competitive Acquisition	No		Coordination with procurement people and DSAC users (A-3:1.3)
T203	IBM OS/360 Generation and Software Maintenance	No		System will be replaced soon, otherwise sys-gens would be contractible. Custom software maintenance would not be contractible (A-2:2.7)
T204	Test Laboratory Planning and Management	No		Management, coordination in use of laboratory at DSAC (A-3:1.2,3)
T205	OS and VS Support Systems and Utility Software	No		Involves custom software (A-2:2.7)
T206	Honeywell Software Planning, Generation and Maintenance	No		Custom software, system will be removed after 1985 (A-2:2.7)
T207	Project/Function Technical Coordination	No		Coordination and technical assistance to application systems staff (A-3:1.3)

Exhibit C-1 (cont.)

DMAP No.	Objective	Contracti-bility	Contractible Portion	Reasons for Non-Contractibility
T208	IV Phase Support	Partial	System engineering, new system software development	Limited contractor resources (A-3:2.3). Local technical support needs not well defined (A-3:1.1)
T210	Execution System Generation/ Maintenance	Possible partial	Commercial software maintenance	Trouble-shooting (A-3:1.1), lack of vendor support (A-3:2.3), custom systems software (A-2:2.7)
T211	RFP Development	No		Technical assistance to DLA Hdq. (A-3:1.5)
T212	Site Planning	Possible	Planning studies	Low level of effort (A-3:2.6,7)
T213	System Engineering Support	No		Undefined (A-1:1.1)
T214	Systems Software Development, Maintenance and Support	No		Custom system software (A-2:2.7)
T215	ADPE Performance Measurement and Evaluation	Possible partial	Large evaluation studies	Small jobs generally, rapid turnaround (A-3:2.5)
T216	DPI Operational Profile Development and Remaining Capacity Determination	No		Low level of effort (A-3:2.6,7)
T217	ADPE Utilization System Management, Operation, Maintenance and Support	Possible partial	Maintenance of commercial package for monitoring	Coordination (A-3:1.3)
T218	DSAC Test Laboratory Support	No		Staff coordination (A-3:1.3)
T219	ADP Security Standards	No		Policy, documentation (A-3:1.2)
T220	Hardware/Software Measurement Packages	No		Not an active function--using commercial and DSAC developed packages
T221	State-of-Art Research and Training	No		Staff time for training (Administrative Task)

Exhibit C-1 (cont.)

DMAP No.	Objective	Contracti-bility	Contractible Portion	Reasons for Non-Contractibility
T222	Simulation/Mathematic Models	Possible	Acquire/develop or contract simulations	No longer a DSAC-T mission
T223	Teleprocessing Software Development/Support	No		Existing DSAC support software--no new developments
T224	Commercial Software Support	Partial	Maintenance of packages, enhancements	
T225	Data Management	Possible	Support/training for new DBMS	DSAC custom software (A-2:2.7)
T226	Technical Documentation	No		Coordination (A-3:1.3)
T227	Program Development Research Standardization and Support	Partial	Research into technology	Final evaluations/decisions (A-3:1.2)
T228	Interactive Programming/On-line Program Development	No		Evaluations, staff training (Administrative functions)
T229	Program Design Techniques and Specifications	No		Close coordination/support of application staff, review, etc. (A-3:1.3)
T230	Life Cycle Management	No		Consulation, staff support--undefined (A-3:1.1)
T231	Automation of Documentation	Deleted		No longer a project, conversion completed
T232	Software Development and Technical Support	No		DSAC custom software (A-2:2.7)
T233	Management Information Retrieval System	No		Maintenance of systems software (A-2:2.7)
T234	Teleprocessing and KSP Development Standards and Support	No		Develop standards (A-3:1.2)

Exhibit C-1 (cont.)

DMAP No.	Objective	Contractibility	Contractible Portion	Reasons for Non-Contractibility
T235	Program Testing Standards/ Procedures and Techniques	Possible partial	Research into methods in use elsewhere	Develop standards for DSAC (A-3:1.2)
T236	System Standards	Possible partial	Testing for compliance	Setting standards (A-3:1.2)
T250	Computer Operations	Possible	Operations	
T251	Peripheral Operations			
T252	Tape Librarian			
T253	Operations Control Center			
T254	I/O Control and EAM			
T255	Keypunch			
T256	ADPE Backup Support (FAWESP)	No		Detail systems knowledge required (A-3:2.3), coordination (A-3:1.3)
T257	ADP Auditing	Possible	Auditing function	Desire to have internal capability (A-3:2.2)
T258	On-line Graphics Terminals	Partial	Analysis of alternatives, preparation of specifications	Final evaluations/decisions (A-3:1.2)
T259	Interactive Instructional Systems	Deleted		
T260	Data Base Support	Partial	Review of alternatives (in process of contracting)	Final evaluations/decisions, standards (A-3:1.2)
T261	SAMTAM Conversions	No		One was completed, further conversion is not expected to occur.

EXHIBIT C-2

CONTRACTING DSAC TELECOMMUNICATIONS OBJECTIVES

DMAP No.	Objective	Contractibility	Contractible Portion	Reasons for Non-Contractibility
R010	Management and Supervision	No		Management function (A-3:1.4)
R020	Administrative Support	No		Must be directly supervised (A-3:1.4)
R030	ADPER	No		Mostly advisory function--represent DSAC (A-3:1.5)
R201	DIA Telecommunications Planning	Partial	Planning studies	
R202	AUTODIN II Planning/Support	No	Possibly future planning	Mostly interagency coordination (A-3:1.5)
R203	IASA Participation	No		Interagency coordination (A-3;1.5)
R204	Development of Telecommunications System Requirements	No		Defining requirements (A-3:1.2)
R205	Communications Processor Maintenance	Possible	Maintenance--now contracting for hardware and software maintenance	Obsolete equipment (A-3:2.3)
R206	Special Projects/Transmissions Systems/Technical Development	Partial	Special projects	Low-level effort (A-3:2.6,7)
R207	Teleprocessing and Telecommunications Networking	No		Low-level effort, building onto network (A-3:2.6,7)
R209	Standard Test Data Base and IOT/Implementation Support	No		Knowledge of DSAC environment (A-3:2.3)
R210	Network Design and Configuration Control	No	Already designed	Network management function (A-3:1.4)

DMAP No.	Objective	Contracti-bility	Contractible Portion	Reasons for Non-Contractibility
R211	Datacom Nodal Monitor Facility	Possible partial	Monitoring system	Development of procedures (A-3;1.2)
R212	ADP/Communications Interface Maintenance	Partial[1]	Programming of new system	Critical system--Needs DSAC functional analysis, systems analysis, maintenance of existing system (A-2:2.4)
R213	Software Support	No		Critical system (A-2:2.4)
R214	Electronic Mail/Office Automation	Partial[1]	Office automation program specification development; prototype installation	Electronic mail must be implemented soon--no time to contract (A-3:2.5)
R215	Integrated Digital Circuits	Possible	Analysis of state-of-the-art, planning study	Uncertain requirements (A-3:2.1)
R216	Communications Processing Equipment Replacement	No		Requirements done, now evaluation/decision (A-3:1.2)
R217	Computerized Telephone	Partial[1]	Analysis of state-of-the-art, demonstration project	Uncertain requirements (A-3:7.1)
R218	Secure Voice	No		Security problems, uncertain requirements (A-3:1.1)
R219	Telephone Management System	Yes[1]	Develop integrated monitoring system, analyze alternatives	

[1]Specific projects suitable for contracting are identified.

APPENDIX D

CRITERIA APPLIED TO SYSTEM CHANGE REQUESTS

APPENDIX D

CRITERIA APPLIED TO SYSTEM CHANGE REQUESTS

SAMPLE DESIGN

Sy.tem Change Requests in five DSAC directorates were sampled using a stratified random sampling technique. The table below shows sample and population data.

Directorate		#SCRs	Remaining Hours	Total Hours
Materiel Management	Population	874	177,781	290,585
	Sample	72	86,815	135,450
Subsistence Management	Population	109	66,586	109,254
	Sample	13	58,075	82,034
Depot Management	Population	128	45,865	128,806
	Sample	24	36,785	104,543
Technical Support	Population	111	39,347	90,341
	Sample	17	22,721	74,204
Telecommunications	Population	67	15,995	65,838
	Sample	8	3,749	8,316
Totals	Population	1289	345,574	684,824
	Sample	134 (10.4%)	207,875 (60.2%)	404,547 (59.1%)

Estimates of the amount of development effort required by project stage were assigned as follows:

Project Stage	Est. Amount (%) of Effort Required
Functional Analysis -	30%
System Analysis -	20%
Program Analysis -	20%
Programming -	30%
	100%

Exhibits D-1 to D-5 display the results of applying the criteria to the SCR sample for the following five DSAC Directorates:

Exhibit	Directorate
D-1	Materiel Management
D-2	Subsistence Management
D-3	Depot Management
D-4	Telecommunications
D-5	Technical Support

Information Fields, Exhibit D

Task # - the SCR number as it appears in Project Management System (PMS) reports.

Task Name - the SCR Title as it appears in PMS Reports.

ESTHRS - the total estimated hours appearing on the PMS listing sampled (DSAC/M, listing--7/10/81, all other Directorates--7/31/81).

REMHRS - remaining task hours (hours sampled).

CTR - Contract potential, as indicated by the following codes (assigned as result of analysis):

- P - contractible project (may combine revisions).
- PP - possibly contractible
- TO - Task order--add to existing contract
- PTO - possibly contractible task order
- ? - possibly contractible, but work undefined

CTRHRS - The number of ESTHRS hours determined, as a result of the analysis, to be contractible.

CPT - The contractible portion of task:

- PA - Program analysis and programming portions
- PPA - Partial program analysis and programming portions
- T - Total task
- P - Programming only
- PT - Partial task, planning or implementation activity

PROB - The reasons for non-contractibility (Appendix A criteria references).

- FUNC - DSAC functional or systems expertise required (A-1:6.3, A-2)
- BO - Blanket order task (A-2:1.3)
- DEF? - Work not fully defined (A-1:2.1, A-2:1.3)
- CMPLX - Complex logical changes involved (A-2:2.3)

INT - Interfaces to other systems involved (A-1:2.2, 3.2; A-2:2.2)
//TSK - Parallel tasks performed by DSAC restrict contracting (A-2:2.6)
CP - Critical programs involved (A-2:2.4)
MFC - Master file changes required (A-2:2.1)
SUSP - Suspended task (A-2:1.2)
CANC - Cancelled task (A-2:1.2)
CSS - Changes to custom DSAC systems software required (A-2:2.7)
MULTS - Multiple subsystems involved (A-2:2.2)
MGT - Management functions (A-2:1.1)
TEST - Test environment involves AUTODIN, DLA telecomminca-tions network, or an operational system (A-2:2.8)
MANYP - Many (ten or more) programs involved (A-2:2.5)
PART - Only part of the task can be contracted because DSAC functional or systems expertise is required for the other part (A-1:6.3, A-2)

PRJHRS - Projected hours contractible for the population of SCR's, computed as follows for each SCR sampled:

For the Materiel Management, Subsistence Management, Technical Support and Telecommunications Directorates,

CTRHRS ÷ REMHRS x 2000 = SCR Population Contractible Hours

where

2000 = the number of population hours represented by the SCR sampled.

For the Depot Management Directorate,

CTRHRS ÷ REMHRS x 1200 = SCR Population Contractible Hours

where

1200 = the number of population hours represented by the SCR sampled.

EXHIBIT D-1

SCR SAMPLE, MATERIEL MANAGEMENT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROD	PRJHRS
USBON-152	ADP PROGRAM REDOCUMENTAT	4140	2900	PP	4140	T	FUNC	4140
USBON-153	ADP PROGRAM REDOCUMENTAT	2130	1556	PP	2130	T	FUNC	2738
USBON-167	REQMNTS REDESIGN USRC05	7472	1728	PP	7472	T		8648
USIO3-063	FMS BACKORDERS ROPL	160	152		0		CP	0
USIOH-032	DECISION CODE AC PROCESS	1518	1176		0		MFC	0
USIOH-033	SOURCE PREF TABLE & STOE	2621	2253		0		MFC	0
USIOH-072	WEAPON SYSTEM SUPPLY AVIL	1014	838	TO	507	PA	FUNC	1210
USIOH 082	DISPOSAL DOCUMENTS	178	170		0		CP	0
USIOH-1-123	REVISE APP E-506P	120	120		0		FUNC	0
USIOH-328	REDISTRIP REQ PROC	256	192		0		CP	0
USIOH 373	MECHANIZED MAPAD	1885	1293		0		SUSP	0
USIOH-421	RECONCILIATION RESPONSES	648	272		0		MFC	0
USIOH-723	SAMMSTEL NIR	656	456	TO	328	PA	FUNC	1439
USIOH-724	SAMMSTEL NIR DTE CHGE	579	347		0		CANC	0
USIOH-753	STATUS DOC UNIT PRICE	363	245		0		SUSP	0
USIOH-859	LOGISTIC REASSIGN PROCESS	935	110		0		MFC	0
USIOH-900	SCAF NOD SUBSISTENCE	1041	891	?	0		DEF?	0
USIOH-950	MILSTRIP PERFORMANCE REP	664	308	TO	332	PA	FUNC	2156
USIOI-267	CAP DELETION DIC ZLZ	362	180		0		MFC	0
USJOH-200	ROLD UP SUN SITLM IN SAMM	1194	683		0		MFC	0
USJOH-232	GAIN/LOSS VAR WEIGHT ITEM	160	160	?	0		DEF?	0
USJOH-252	REQN HIST INQUIRY	536	496	TO	268	PA	FUNC	1081
USJOH-286	ADJUSTMENT DOC FOR GLAF	738	652		0		MFC	0
USJOH 294	MAP STK ISSUES MATCH	262	230	TO	131	PA	FUNC	1139
USJOH-296	FMS BILLING CARD FORMAT	124	88	TO	62	PA	FUNC	1409

EXHIBIT D-1 (cont'd.)

SCR SAMPLE MATERIEL MANAGEMENT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROB	PRJHRS
USFOH-312	REFORMATING F-2-11 REPT	80	65	TO	40	PA	FUNC	1231
USLOH-001S	DISMS PUB REQUIREMENT	8000	4000		0		FUNC	0
USPOG-1-987	PACK DATA FROM SAMMS/MOW	100	80		0		CANC	0
USPOH-070T	ACF UPDATE ACTIONS	9174	1319	P	2500	PP	PART	3791
USPOH-076-1	CONTRACT AWARD STATS	368	46		0		//TSK	0
USPOH-079T	APRF ONLINE UPDATE	5625	565	TO	1688	P	INT	5975
USPOH-287	SIS FAILURES PHASE II	956	836	TO	400	PPA	CP	957
USPOH-364	REV YPK PROCESS	820	804	?	0		DEF?	0
USPOH-394	REV FSCM VENDOR FILE	1953	1289		0		MFC	0
USPOH-422	NSN/FSCM FILE UPDATE CISP	1336	1044		0		SUSP	0
USPOH-472	GEN SYS REQMNT	624	374	TO	312	PA	FUNC	1668
USPOH-481	PROCESS ADDITIVE CLINS	2438	1867		0		MFC	0
USPOH-482	BUYER DIRECT RFQ SASPS 2	9656	8581		0		MANYP	0
USPOH-483	COMP GEN DEL ORDERS	3703	3273	TO	1852	PA	FUNC	1852
USPOH-498	MILSCAP "P" MODIFICATION	6947	6570	P	2084	P	INT	2084
USPOH-519	SAMMS CLIN PROCESS C & T	8152	3700		0		MANYP	0
USPOH-520	CONSOLID SASPS PHASE 2	4518	4324		0		MFC	0
USROC-005	NSO FRACT BY-PRODUCT	127	127	TO	64	PA	FUNC	1000
USROH-042	SCF UPDATE	578	431		0		INT	0
USROH-279	PROVISIONING SUPPORT STAT	482	462		0		MFC	0
USROH-390	INVALID ROUTING DIC ZR8	172	172		0		SUSP	0
USROH-392	ZGS QTY FIELD SIZE	254	214		0		CP	0
USROH-395	MEDICAL REPAIR PARTS	1022	984	TO	511	PA	FUNC	1039
USROH-416	SUPPLY CTL FILE CLEANUP	1362	524		0		INT	0
USROH-420	UPDATE WS INDICATORS	544	287		0		CP	0

EXHIBIT D-1 (cont'd.)

SCR SAMPLE, MATERIEL MANAGEMENT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROB	PRJHRS
USROH-442	SAFETY LEVEL ENHANCEMENTS	592	401		0		INT	0
USROH-443	VARIABLE RETENTION LIMITS	1196	980		0		SUSP	0
USROH-445	PRINT SEQ OF APPENDIX F-7	72	64	TO	36	PA	FUNC	1125
USROH-479	SMR ENHANCEMENTS	360	308		0		CP	0
USROH-501	POSITION STOCKS AT SSDS	1114	698		0		MFC	0
USROH-513	NEW PROVISIONING BUYS	160	140		0		CP	0
USROH-581	ALTER THE MAX REL QTY	1410	1079		0		CP	0
USROH-586	DEL INVALID LOGISTICS	2856	2812		0		MANYP	0
USROH-588	PROV STRAT/PROV UFD	1731	1663	TO	866	PA	FUNC	1041
USROH-599	SUPPLY MANAGEMENT DATA	1131	598		0		FUNC	0
USROH-610	MATERIEL RETURN PROG	1365	1233		0		CP	0
USROH-664	REV TO DIDS	1130	1100	?	0		DEF?	0
USROH-730	DOD 4140.32-M DLIP	4530	4504		0		CMPLX	0
USROH-8130	WAR RESERVE MOD FOR WSW	3317	945	TO	400	PP	INT	846
USROH-913	F-434 STAT REPORT	745	735	TO	373	PA	FUNC	1015
USROI-829	PRODUCTION LEAD TIME DAYS	136	124	TO	68	PA	FUNC	1096
USROI-832	MPR E039V PROCEDURES	101	100	?	0		DEF?	0
USTOE-204	DATA ENTRY-REF NR SEARCH	257	205	TO	129	PA	FUNC	1258
USTOH-624	PROCESS ISA FM TRANS	9514	5424	P	2854	P	INT	2854
USTOH-624-1	PROCESS ISA FM TRANS	2036	1777	P	610	P	INT	698
USTOH-630	CHANGABLES & SUBSTITUTES	800	400		0		CANC	0
USTOH-647	MODIFICATION TO F-317	2650	2621	?	0		DEF?	0
	HOURS TOTALS	135450	86815		30157			58490
				P				24953
				TO				28537

EXHIBIT D-2

SCR SAMPLE, SUBSISTENCE MANAGEMENT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROB	PRJHRS
UBDSP-S054	MECH PREP VAN TAILORED	6050	4632	PP	2500	PPA	INT	2500
UBDTN-D047	TRANSP EXPT APPL OF FDS	12800	10809	P	6400	PA	INT	6400
UBENP-S392	REQUISIT STATUS FILE	280	280		0		MFC	0
UBFFP-L143	DCASR ADV PROGRES PAYMENT	1040	1000		0		MFC	0
UBFFP-L151	AGE LIST INCLUS RVN DATE	180	160		0		MFC	0
UBHHP-S7894	CROS/REF DELE BNR ITEMS	1600	1600		0		MFC	0
UBMRN-D054	FDS-(ALPRO)	7700	5443		0		MFC	0
UBMRN-D061	OFFSHORE CONTRACT	7600	6756	P	3800	PA	INT	3800
UBPCN-D037	MGMT REQUIR C&F FDS	24616	16830	P	7385	P	FUNC	7385
UBPFN-D038	FFAVORS	12361	2838	P	3708	P	FUNC	3708
UBSIP-S448	TRANS/PRT RAD EX/LIST DSO	565	525	TO	283	PA	FUNC	1078
UBSNN-D069	PERISHABLE MIS	7194	7158	P	2500	PP	PART	2500
UBSRF-S517	ADDITION CUSTOMERS EUR PR	48	44	TO	24	PA	FUNC	1091
	HOURS TOTALS	82034	58075		26600			28462
				P				26293
				TO				2169

EXHIBIT D-3

SCR SAMPLE, DEPOT MANAGEMENT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	OPT	PROD	PRJHRS
DWOO9005	DWASP CONCEPT TEST PLAN	2199	839	PP	1100	PA	INT	1573
DWOO8005 R1	DWASP CONCEPT TEST PLAN	7526	5708	PP	3763	PA	INT	3763
DWOO9902	DWASP DATA ANALYSIS	10722	2216		0		//TSK	0
DWOO9903	DWASP FUNC DESCRIP DETAIL	45805	10609		0		FUNC	0
DVSUN219	BUSS PROCURE FINANC TNG	9180	4939		0		FUNC	0
DVVUC1-064	BY PASS CODE FOR ORDERS	508	500	TO	152	PPA	CP	365
DVVUN-1-603	BUSS MAINTENANCE	480	400	?	0		EO	0
DVVUL-1-604	BUSS DOCUMENTION	240	200	?	0		EO	0
DWIMM010	GBL TAPE RECORD MTNC REQ	1752	444		0		MFC	0
DWIOH1-052	GBL MICROFILM PROCESS	60	44		0		SUSP	0
DWROH072	MOD CONTRACT DATA CARDS	1396	869		0		MFC	0
DWROH109	AUTOMATIC DIC PREP	892	294		0		MFC	0
DWRON-1-615	MOWASP MAINTENANCE	6440	1597	?	0		BO	0
DWRON-1-616	MOWASP DOCUMENTATION	1340	699	?	0		BO	0
DVRON1-114	REFINE THE F-9	2330	2825		0		SUSP	0
DWSOH#67	PROV UNIT OF SCHED FOR LV	200	130		0		//TSK	0
DWSOH972	DIRECT TRANS HAZARD NTIN	720	222		0		MFC	0
DWSOH#84	REV SUBT CONTRIBUTE ASSIGN OPT	2460	618		0		CMPLX	0
DWSON-1-618	MOWASP MAINTENANCE	4975	1243	?	0		BO	0
DWSON-1-619	MOWASP DOCUMENTATION	1274	552	?	0		BO	0
DWTOH1-056	MONTHLY/WEEKLY SEAVAN RPT	536	516	?	0		DEF?	0
DWTOY1-051	AUTOMATN DICOMSS INVENTRY	200	176		0		SUSP	0
DWOONI40	ISAC-D SOFTWARE TO MVS	300	73		0		CSS	0
DWOO9101	INTERFACE DISARS TO MOWAS	2508	1072		0		MULTS	0
	HOURS TOTALS	104543	36785		5015			5701
				P				5336
				TO				365

EXHIBIT D-4

SCR SAMPLE, TELECOMMUNICATIONS DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROD	PRJHRS
UUAAH-AUPER	AUPER	1720	1113		0		MGT	0
UUZON1-206	STUDY BELL SYSTEM NETWORK	500	412		0		MGT	0
UUZON1-210	DIAGNOSTIC EQUIP DLA NET	100	100		0		MGT	0
UUZOZ-002	STAND OPR PROC DLA TP NET	300	210		0		MGT	0
UUZOZ-003	COMTEN NETWRK CONFIG MGMT	2656	819	?	0		EO	0
UUZOZ-027	COMTEN SYSTEM TRAINING	1600	329		0		MGT	0
UUTO% DSUS	IMPL IV PHASE DSUS	700	200		0		MGT	0
UYOON-002	DRNS TOT CONTRAL PHASE 2	740	566	PTO	370	PA	FUNC	1307
	HOURS TOTALS	8316	3749		370			1307

EXHIBIT D-5

SCR SAMPLE, TECHNICAL SUPPORT DIRECTORATE

TASK #	TASK NAME	ESTHRS	REMHRS	CTR	CTRHRS	CPT	PROB	PRJHRS
NIAAN-026	MVS IMPL AT DSAC	24713	3809	P	6178	PT	DEF?	6178
NIAAN-030	MVS FIELD SITE PLANNING	2060	1485	TO	1030	PT	DEF?	1387
NIACN-1-009	COMPUTER PERFOR EVAL	3380	1416	?	0		BO	0
NIBON-1-003	MAJAUS DOC STANDARDIZATION	400	271		0		MGT	0
NIBON-1-004	SOURCE LIB & PREPROC SUPP	1450	586	?	0		BO	0
NIBON-1-007	MAINT SYS1 PROCLIB	275	143		0		MGT	0
NIBON-1-009	DATA ELE STDZ SYS DESS	50	50	?	0		BO	0
NIBON-1-061	SEMI-ANNUAL CHANGE 4730.1	1208	1088		0		MGT	0
NIBON-1-063	PROVIDE LCM CONSULTATION	360	354		0		MGT	0
NIBON1-060	DLA AIF MGMT MANUAL DEV	300	200		0		MGT	0
NIBON1-069	UPDATE LCM VOL VIII	1628	1628	?	0		BO	0
NIBON1-069	UPDATE LCM VOL VIII	1628	1628		0		MGT	0
OLAAH-ADPLR	ADPER	8857	6823	?	0		BO	0
ONAZN-002	DBMS PH II; SEC II	990	423	?	0		BO	0
OTIONS10701	AUTO DATA SYSTEM D	9087	281		0		CANC	0
OT368 001	OTIL MAIN DATA COL & REP	15577	1724		0		DEF?	0
OTIO7-DSOS	IMPL IV PHASE DSOS	2041	812		0		TEST	0
	HOURS TOTALS	74204	22721		7208			7565

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Contracting out; criteria for contracting; computer system development, maintenance, productivity

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Defense Systems Automation Center can contract substantial amounts of its systems development workload to commercial organizations. The workload that can be contracted is identified and criteria are provided for evaluating future workloads. Recommendations are provided for contracting and for increasing internal development productivity.

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